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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor	:	Masayuki Ozawa, Shigeru Suzuki
Serial No.	:	08/731,754 (Reissue Application of U.S. Patent 5,357,091)
Filed:	:	October 18, 1996
Title	:	CARD TYPE INPUT/OUTPUT INTERFACE DEVICE AND ELECTRONIC DEVICE USING THE SAME
Examiner:	:	T. LE (Special Program Examiner Edward Glick)
Group Art Unit		2876

September 7, 1999

VERIFIED TRANSLATION OF PRIORITY DOCUMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

SIR:

Enclosed is a Verified English translation of the priority document JP 3-124635 whose priority has been claimed in the present application.

Respectfully submitted,

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I, Tadahiko Itoh, a Patent Attorney of Tokyo, Japan having my office at 32nd Floor, Yebisu Garden Place Tower, 20-3 Ebisu 4-Chome, Shibuya-Ku, Tokyo 150-6032, Japan do solemnly and sincerely declare that I am the translator of the attached English language translation and certify that the attached English language translation is a correct, true and faithful translation of Japanese Patent Application No. 3-124635 to the best of my knowledge and belief.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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SERIAL NO.: 08/731,754 DATE FILED: 10/18/96
DOCKET NO.: FUJ 13.208 DATE MAILED:

ENCLOSURES: Submission including:(a) Statement under 37CFR 3.73;(b) copies of original submission of priority document, including stamped postcard; (c) IDS with three Japanese reference and English language translations (d) verified English translation of priority document.

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PATENT OFFICE

JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of the following application as filed with this office.

Date of Application: April 30, 1991

Application Number: Japanese Patent Application No. 3-124635

Applicant(s) FUJITSU LIMITED

April 17, 1992

Commissioner,
Patent Office Wataru Fukazawa (Seal)

Certificate No.04-012917

(Document Name) Application for Patent
(Reference Number) 9020759
(Date of Submission) April 30, 1991
(Destination) Commissioner of Patent Office
(IPC) G06F 13/00
(Title of the Invention) CARD TYPE INPUT/OUTPUT INTERFACE DEVICE
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(Lists of Submitted Documents)
(Document Name) Specification 1

(Document Name) Drawing 1

(Document Name) Abstract 1

(Number of General Power of Attorney) 9002152

Serial Number 91P04372
[Name of Document] Specification
[Title of Invention] Card Type Input/Output Interface Device

[Claims]

[Claim 1] A card type input/output interface device, comprising:

a first connection part (1) formed on a first edge of a card (4) that is inserted in a card insertion slot in a main body of an electronic device for transferring data between said main body of an electronic device and said first connection part (1);

a second connection part (2) formed on a second edge of said card (4) for transferring data between an external device and said second connection part (2); and

a circuit (3) coupled so as to transfer data between said second connection part (2) and said first connection part (1).

[Claim 2] The card type input/output interface device of claim 1, wherein said second connection part (2) comprises a radio receiver/transmitter for transferring data between said external device and said second connection part (2) by radio.

[Claim 3] The card type input/output interface device of claim 1, wherein said second connection part (2) comprises a thickness of a second edge of said card (4) partially increased and mounting a connector, said connector enabling transfer of data between said external device and said second connection part (2).

[Detailed Description of the Invention]

[001]

[Field of the Invention]

The present invention relates to a card type input/output interface device for the purpose of connecting a main body of an electronic device and an external device.

Advances in semiconductor technology have brought about the down-sizing of various electronic devices. Attendant upon such advances has been the adoption of an IC (Integrated Circuit) memory card, which can be inserted into a slot in the main body of an electronic device and which functions as an external storage device. Additionally, in small-scale electronic devices a connector is provided for connecting an external device such as a printer or a modem for data transfer. There is currently a need for further down-sizing and for cost reduction of such electronic devices.

[0002]

[Description of the Related Art]

An IC memory card comprises integrated non-volatile memories, such as a mask ROM and an EEPROM, or integrated volatile memories, such as SRAM and DRAM, mounted on a card. If, for example, 12 IC memories each having a storage capacity of 64 kbits are mounted on a card, an IC memory card having a storage capacity of 768 kbits will be formed. Accordingly, it is easy to form an IC memory card having a storage capacity of a few megabytes to tens of megabytes by mounting a number of megabit-size IC memories on one chip. Additionally, an IC card has been developed for practical use in which an integrated processor has been mounted together with such IC memories, making possible data processing using the processor. In contrast to the IC memory card, this type of IC card is called a smart card or

an intelligent card.

[0003]

The external dimensions of the IC memory card or IC card are, for example, 85.6 x 54.0 x 3.3 mm. These cards are inserted into card insertion slots of electronic devices such as personal computers and word processors and, in that state, are connected to the internal bus either directly or via a register. As types of connecting structures there are elastic contact connections and there are magnetically coupled or electrically coupled non-contact connections. The non-contact type of connecting structure lacks mechanical connective portions and hence is durable as well as free from failures due to poor physical connections. However, the composition of the coupling functions of non-contact type connecting structures is complicated and data transfer speeds cannot be very high.

[0004]

Nowadays, electronic devices such as laptop-type personal computers and word processors use the IC memory cards described above as replaceable external storage devices, allowing such electronic devices to be made more compact. Such down-sizing makes it more difficult to accommodate all functions within the main body of an electronic device, so typically a connector for connecting a printer or other external device is mounted on a side wall of the main body of the electronic device.

[0005]

[Problem The Invention Attempts To Solve]

In an effort to make the personal computers, word processors and other electronic devices described above even more compact, such electronic devices are often stripped of accessories or functions that are not commonly used. For example, if the personal computer or word processor is not

ordinarily used for data transfer, then a modem would perhaps be provided as an external device, to be connected to the main body of an electronic device by a connector when data is to be transferred. For that purpose a connector is mounted on a side wall of the main body of a down-sized electronic device. Space is required to mount such a connector, however, thus limiting the extent to which the electronic device can be down-sized.

Instead of such a connector a cable may be strung from the main body of the electronic device to provide a semi-fixed connection with an external device. However, for laptop computers and other electronic devices that are often moved a cable is inconvenient.

The present invention has as its object to further down-size the main body of an electronic device by using the slot for the insertion of an IC card or IC memory card to connect the main body of the electronic device to an external device.

[0006]

[Method Used To Solve the Problem]

The card type input/output interface device of the present invention comprises a first connection part 1 formed on a first edge of a card 4 that is inserted in a card insertion slot in a main body of an electronic device for transferring data between the main body of the electronic device and the first connection part 1, a second connection part 2 formed on a second edge of the card 4 for transferring data between an external device and the second connection part 2, and a circuit 3 coupled so as to transfer data between the second connection part 2 and the first connection part 2.

[0007]

Additionally, the second connection part 2 comprises a radio receiver/transmitter unit and can

transfer data between the external device and the second connection part 2 by radio. Moreover, a thickness of a second edge of the card 4 is partially increased and mounts a connector so as to form the second connection part 2.

[0008]

[Working of the Invention]

By inserting it into the card insertion slot of the main body of an electronic device, a typical IC memory card functions as an external storage device, from which data can be read and to which data can be written. Therefore by inserting a card type input/output interface device into that card insertion slot in the direction indicated by the arrow, and by connecting the first connection part 1 and the bus of the main body of the electronic device by either a contact-type or a non-contact-type connecting structure and by connecting the second connection part 2 and the external device by either a connector or a radio, the main body of the electronic device and the external device can be connected via a card type input/output interface device. If at that time the above-mentioned circuit 3 comprises a processor having a data processing function, then it is also possible to realize an interface function that performs series-parallel data conversion, error detection and so forth. Accordingly, there is no need to mount an input/output connector on the main body of the electronic device and, further, it is also possible to eliminate the input/output interface circuit.

[0009]

Additionally, in case the second connection part 2 comprises a radio transmitter-receiver unit, it is possible to transfer data by radio between the second connection part 2 and the external device in a state in which a thickness of the second edge of

the card 4 is made approximately identical to the thickness of the typical IC memory card. Moreover, it is possible to make the main body of the electronic device compact if a connector is mounted on the second edge of the card 4 as the second connection part 2, because it is no longer necessary to mount a connector directly on the main body of the electronic device.

[0010]

[Embodiment of the Invention]

FIG. 2 is a diagram for explaining an embodiment of the present invention, with FIG. 2A showing a schematic side view and FIG. 2B showing a schematic block view. In the diagram, 10 is the card type input/output interface device, 11 is a main body IF composed of the connector that forms the first connection part 1, and 12 is a connection part that forms the second connection part 2 and is composed of an antenna 12-1 and a radio transmitter/receiver unit 12-2. Also, 13 is a data transfer unit that forms the circuit 3, 20 is the main body of a personal computer, word processor, calculator or other compact electronic device, 21 is a bus of the main body of the electronic device, 30 is a printer, modem or other external device, 31 is a radio for the purpose of connecting the second connection part 12 of the card type input/output interface device 11, 31-1 is an antenna, 31-2 is a radio transmitter/receiver unit, 32 is a connector for the purpose of connecting another external device and 33 is an external device IF unit.

[0011]

The card type input/output interface device 10 comprises a main body IF unit 11 that forms the first connection part 1 mounted on a first edge of the card, the antenna 12-1 and radio transmitter/receiver unit 12-2 that form the second

connection part 2 mounted on the second edge of the card, and a data transfer unit 13 that forms the circuit 3 that connects the first and second connection parts 1 and 2. The main body IF unit 11 has either a contact type or non-contact type structure that connects to the bus 21 of the main body of the electronic device 20, and this embodiment shows a case in which the second connection part 2 is composed of a radio transmitter/receiver unit. Accordingly, the external device 30 comprises the antenna 31-1 and the radio transmitter/receiver unit 31-2. Additionally, though it is possible to use printed circuit board wiring for the circuit 3, this embodiment shows the circuit 3 comprising functions that perform series-parallel data conversion and data transfer control.

[0012]

By inserting an IC memory card in the card insertion slot of the main body of the electronic device 20, the IC memory card is connected to the bus 21 of the main body of the electronic device 20 and is used as an external storage device. Additionally, by inserting the above-described card type input/output interface device 10 instead of an IC memory card, the card type input/output interface device 10 is connected to the bus 21 of the main body of the electronic device 20 by the contact type or non-contact type main body IF unit 11. In this case, the operating power of the radio transmitter/receiver unit 12-2 and data transfer unit 13 of the card type input/output interface device 10 can be supplied by mounting a lithium-ion battery cell or by power supplied by the main body of the electronic device 20 via the main body IF unit node.

[0013]

Additionally, an external device 30 is positioned within a service area of the card type input/output interface device 10 so as to connect the antenna 12-1 of the main body of the electronic device 20 and the antenna 31-1 of the external device 30 by radio. In this case, other devices suffer no interference because the connection is effected by a weak radio signal. Additionally, although there is a possibility of radio interference in the event that an electronic device using an identical card type input/output interface device 10 is situated nearby, by configuring the devices so as to be able to switch radio frequencies to mutually exclusive frequencies this problem of mixed signals can be easily avoided.

[0014]

When an external device 30 is specified by the processor of the main body of the electronic device 20 and there is a data transfer instruction, the data transfer unit 13 of the card type input/output interface device 10 acquires parallel data on the bus 21 via the main body IF unit 11, converts the parallel data to series data and transfers it to the radio transmitter/receiver unit 12-2. The radio transmitter/receiver unit 12-2 then transmits the series data, which has been modulated according to a predetermined modulation method, from the antenna 12-1. At the external device 30 this radio series data is received via the antenna 31-1, demodulated by the radio transmitter/receiver unit 31-2 and then further transferred via the external IF unit 33 to either another external device or to an internal circuit of a printer control unit, modem control unit and so forth inside the external device 30.

[0015]

Additionally, in case the data from the

external device 30 side is to be transferred to the main body of the electronic device 20, the series data supplied to the radio transmitter/receiver unit 31-2 via the external IF unit 33 is modulated into a radio signal, transmitted from the antenna 31-1, and is received via the antenna 12-1 of the card type input/output interface device 10 and demodulated by the radio transmitter/receiver unit 12-2. This demodulated data is series data, so it is converted into parallel data by the data transfer unit 13 and transferred to the bus 21 of the main body of the electronic device 20 via the main body IF unit 11. [0016]

Additionally, although a printer, modem or other input/output interface device can of course be connected to the external device 30, the external device 30 can be configured so as to be provided with a connector such as a standard interface RS-232C connector. That is, as described above the thickness of the card type input/output interface device 10 is extremely thin, being a matter of several millimeters, so it is impossible to mount an RS232C connector thereon. As a result, the connector 32 is mounted on this external device 30. By coupling the connector with the external device 30 by radio a variety of external devices can be connected using an ordinary connector. That is, the main body of the electronic device 20 can be coupled to the external device 30 via the card type input/output interface device 10 without mounting any connector whatsoever, and thus corresponds to a case in which an external interface unit is composed of the external device 30 and the card type input/output interface device 10. As a result, it is possible to make the main body of the electronic device 20 even more compact.

[0017]

FIG. 3 is a block diagram of another embodiment of the present invention, with those parts which are the same as those shown in FIG. 2 given the same reference numerals. In FIG. 3, reference numeral 14 is a start-stop synchronization controller, 15 is a radio demodulator, 16 is a radio modulator, 34 is a driver/receiver, 35 is a radio demodulator and 36 is a radio modulator. This embodiment mounts a standard interface connector 32 on the external device 30, a modem or other external device being connected to this connector 32, and shows a case in which data is transferred by synchronization. That is, as described above, the external interface for the transfer of synchronized data is composed of the card type input/output interface device 10 and the external device 30.

[0018]

As with the embodiment described above, the card type input/output interface device 10 is inserted in the card insertion slot on the main body of the electronic device 20 and connected to the bus 21 of the main body of the electronic device 20 via the main body IF unit 11, and an external device 30 is provided at a position at which the antenna 12-1 of the card type input/output interface device 10 and the antenna 31-1 of the external device 30 are coupled by radio. Additionally, a modem or other external device is connected to the connector 32.

[0019]

When data is to be transferred from the processor (not shown in the diagram) of the main body of the electronic device 20 to a modem or other external device (not shown in the diagram) connected by the connector 32 of the external device 30, the card type input/output interface device 10 is specified and the data is transferred via the bus 21.

The start/stop synchronization controller 14, via the main body IF unit 11, takes the data transferred according to the instructions from the processor via the bus 21, converts it into series synchronized data and transfers it to the radio modulator 15. The synchronized data is modulated by the radio modulator 15 and transmitted from the antenna 12-1.

[0020]

At the external device 30 the data is received via the antenna 31-1 and demodulated by the radio demodulator 35. The demodulated data is then transferred to the connector 32 via the driver/receiver 34, and, via this connector 32 the synchronized data is transferred to a modem or other external device 30 not shown in the diagram. Accordingly, by inserting a card type input/output interface device 10 in the card insertion slot it is possible to couple an external device even without mounting a connector on the main body of the electronic device 20 in the same way as a case in which a connector is mounted.

[0021]

FIG. 4 is a diagram for explaining a second connection part of a further embodiment of the present invention, where FIG. 4A shows a case in which a portion 42a of increased thickness of a card 41 has been provided on a second edge of that card 41 and a connector 43 has been mounted on that portion of increased thickness 42a, in which reference numeral 44 is a jack to be inserted in a connector 43 and reference numeral 45 is a cable. The portion of the card 41 not shown in the diagram, like the IC memory card and the IC card, comprises a first connection part that can connect a bus of the main body of an electronic device when inserted in the card insertion slot of the main body of the electronic device.

[0022]

A compact multi-pin jack known as a modular jack is used for the above-mentioned jack 44. It is possible to form the connector 43 so that it is 7 mm long x 7 mm wide, so if the card 41 has a thickness of 3 mm then the portion of increased thickness 42a will have a thickness of approximately 6 mm. Thus, the total thickness will be equal to approximately 9-10 mm. This thickness does not make the card type input/output interface device difficult to handle as such. Additionally, the dimensions of the main body of the electronic device 20 can be selected so that when the card 41 is inserted in the card insertion slot of the main body of the electronic device 20 this portion of increased thickness 42a enters the card insertion slot and thus does not project beyond a side surface of the main body of the electronic device 20. Additionally, it is also possible to mount the above-described antenna 12-1 or radio transmitter/receiver unit 12-2 in place of the connector 43 on this portion of increased thickness 42a.

[0023]

Additionally, FIG. 4B shows a case in which a width of a portion of increased thickness 42b on a second edge of the card 41 has been made so as to be able to mount a connector 43, such that the card 41 does not become large. In this case, too, the dimensions of the main body of the electronic device 20 can be selected so that the portion of increased thickness 42b enters the card insertion slot of the main body of the electronic device and thus does not project beyond a side surface of the main body of the electronic device.

[0024]

Additionally, FIG. 4C shows a case in which a portion of increased thickness 42c formed on a

second edge of the card 41 has been formed so as to have a portion of increased vertical thickness and a connector 43 has been mounted on the portion of increased thickness 42c. With a card type input/output interface device of this configuration as well, the dimensions of the main body of the electronic device 20 can be selected so that the portion of increased thickness 42c enters the card insertion slot of the main body of the electronic device and thus does not project beyond a side surface of the main body of the electronic device.

[0025]

[Advantages of the Invention]

As described above, the present invention provides an interface that can be inserted into a card insertion slot in the main body of an electronic device such as a personal computer or word processor to connect an external device, thereby making it possible to make the main body of the electronic device even more compact because it is no longer necessary to mount a connector on the main body of the electronic device. As a result, by using a card type input/output interface device of a type compatible with the external device interface, it becomes possible to connect a desired external device and the functions of the main body of the electronic device can be expanded. Additionally, by equipping the circuit 3 of the card type input/output interface device with functions that perform series-parallel data conversion, timing control and so forth, it is possible to further connect a variety of external devices and transfer data.

[0026]

Additionally, in case the second connection part 2 for the purpose of connecting to an external device comprises a radio transmitter/receiver unit,

the thickness of the card can be made to have a thickness identical to the thickness of the ordinary IC memory card, thus providing the advantage of ease of handling. Moreover, with respect to the typical IC memory card and IC card, by mounting a second connection part 2 it is possible to realize both a memory function and an interface function. That is, the conventional IC memory card and IC card operate in a closed environment whereas the card type input/output interface device of the present invention operates in an environment that is open externally, providing the advantage of making possible a variety of applications.

[Brief Description of Drawings]

[FIG.1]

Diagram explaining the basic principle of the present invention.

[FIG.2]

Diagram explaining an embodiment of the present invention, with FIG. 2A showing a schematic side view and FIG. 2B showing a schematic block view.

[FIG.3]

Block diagram of another embodiment of the present invention.

[FIG.4]

Diagram for explaining a second connection part of a further embodiment of the present invention, with FIGS. 4A, 4B and 4C showing schematic oblique views of different shapes of the second connection part, respectively.

[Explanation of Reference Numerals]

1 First connection part 1

2 Second connection part 2

3 Circuit

4 Card

[Name of Document] Abstract

[Summary]

[Object] The present invention relates to a card type input/output interface device for connecting a main body of an electronic device to an external device, and has as its object to make possible a connection to an external device by inserting the card type input/output interface device in a card insertion slot.

[Composition] An interface between a compact main body of an electronic device and an external device, having a first connection part 1 formed one edge of a card 4 for performing data transfer with a main body of an electronic device, a second connection part 2 formed on a second edge of this card 4 for performing data transfer with an external device either by direct contact or by radio, and a circuit 3 composed of a circuit or simply printed wiring for performing data transfer between the first and second connection parts and having functions such as series-parallel data conversion and so forth.

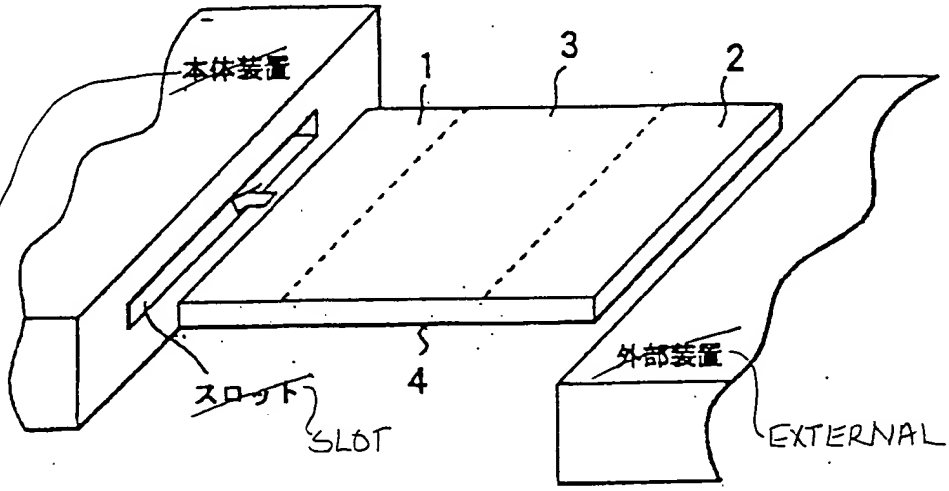
[Selected Drawing] FIG. 1

【書類名】 図面 [Document Name] Drawing

【図1】 FIG 1

DIAGRAM EXPLAINING THE BASIC PRINCIPLE OF THE INVENTION

本発明の原理説明図



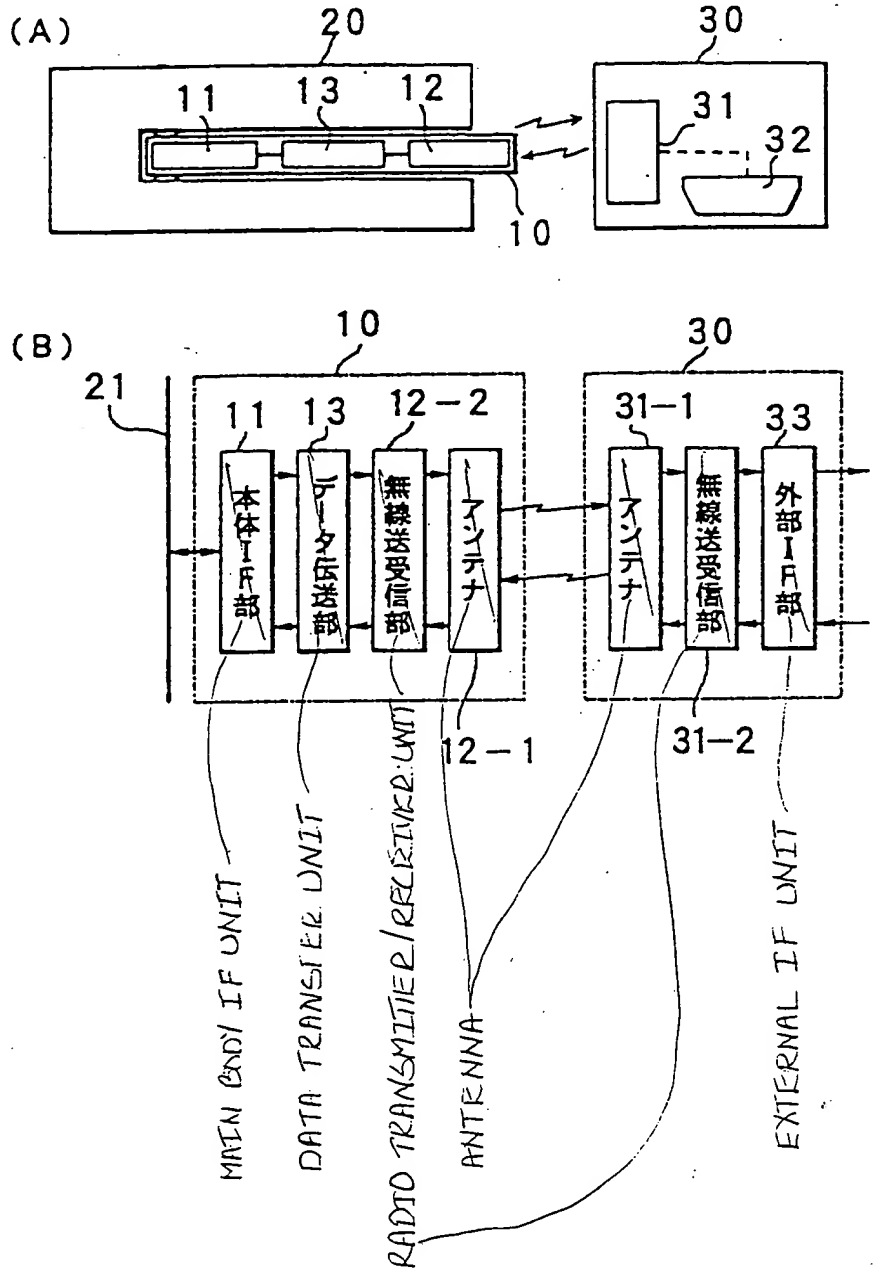
MAIN BODY OF ELECTRONIC DEVICE SYSTEM

SLOT

EXTERNAL DEVICE

【図2】 FIG. 2

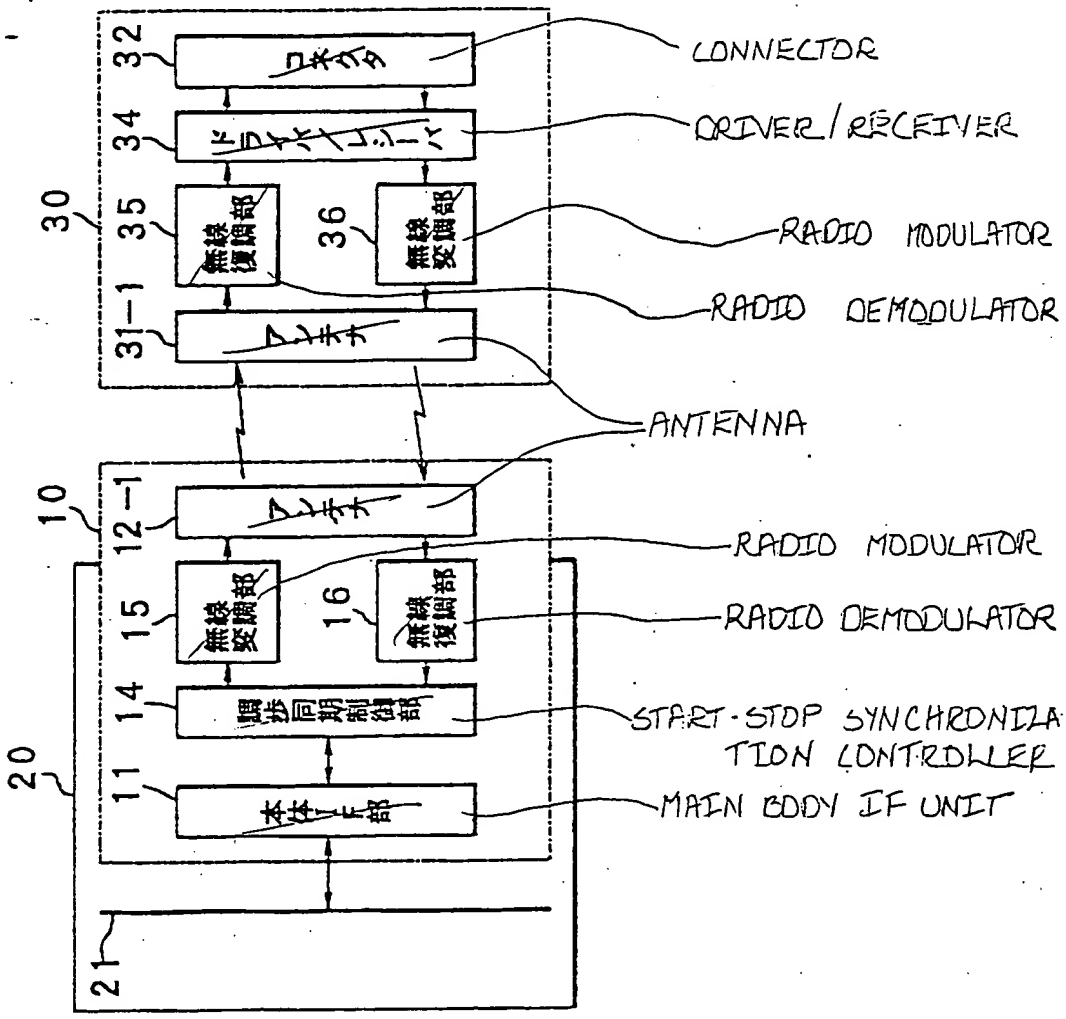
~~本発明の実施例の説明図~~ DIAGRAM EXPLAINING AN EMBODIMENT OF THE PRESENT INVENTION



【図3】 FIG. 3

BLOCK DIAGRAM OF ANOTHER EMBODIMENT OF THE PRESENT INVENTION

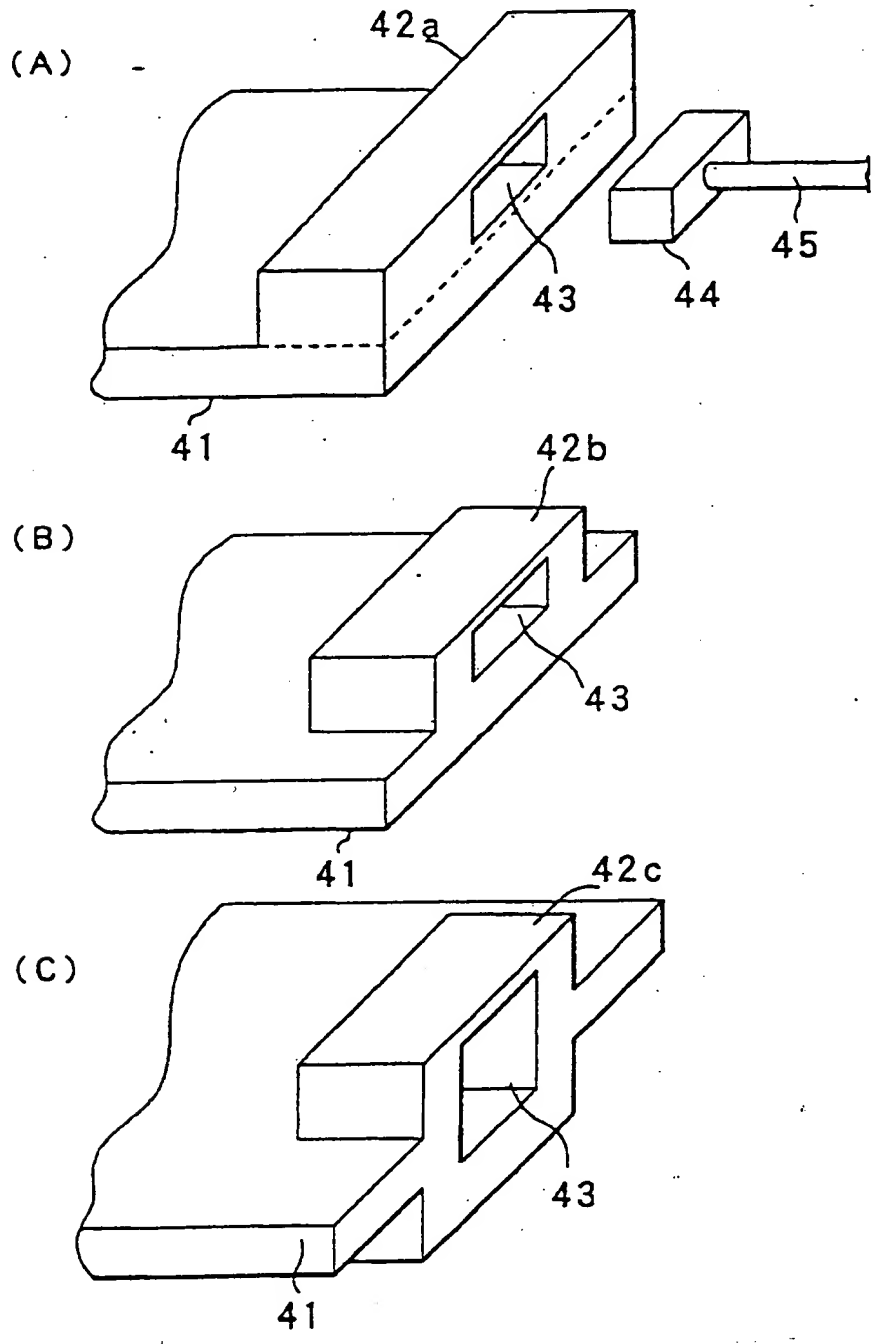
本発明の他の実施例のブロック図



【図4】 FIG. 4

DIAGRAM FOR EXPLAINING A SECOND CONNECTION PART OF YET ANOTHER EMBODIMENT OF THE PRESENT INVENTION

本発明の更に他の実施例の第2の接続部の説明図



(Document Name) Official Correction Data
(Document Corrected) Application for Patent

(Admitted Information / Additional Information)
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